KYVU Technical Overview

Kentucky Virtual University (KYVU) is an innovation of the Commonwealth of Kentucky and the Council on Postsecondary Education. The KYVU does not offer degrees. Its credit-bearing academic programs come from accredited postsecondary institutions. The state's official virtual campus opened its doors to students in the fall of 1999. Since that time, KYVU has provided one-stop access to affordable college credit courses and professional development programs offered online from colleges, universities and other state agencies. For its postsecondary and state agency partners, the KYVU acts as clearinghouse, consultant, and project manager, provides the electronic infrastructure, and acts as the registration and virtual student services arm. The KYVU's students are 34 years old on average; about 70% of them are female, and over 75% are from a rural county.

Currently the KYVU hosts four websites:

- www.kyvu.org
- www.kyvae.org
- www.kyeducators.org
- www.kyvu4k12.org

Much of the website information is fed from a SQL database using ASP. The KYVU portal supports transactions with multiple independent providers that have different learning platforms. KYVU offers its providers use of two course management systems (CMSs) for delivery of curriculum developed by faculty: ANGEL and WebCT. In addition, KYVU offers a single-sign-on to and interfacing for activity reporting with some online curriculum products: PLATO WebLearning Network, WIN Career Solutions, KET LiteracyLink and Indiana University's Learning to Teach With Technology.

The websites and CMS servers are hosted at a Tier 1 ISP data-center managed by Embanet Corporation in Toronto. Highlights of the KYVU integrator's hosting service include: 24/7/365 live monitoring of Embanet's infrastructure, multiple Tier 1 Internet bandwidth providers for redundancy and load balancing, daily backups to protect KYVU providers' courses and intellectual property, monthly archiving of information stored off-site, and multiple data centers. Server administration is shared between the current KYVU Integrator, Embanet, and KYVU staff.

eRMA

KYVU's learning management system, eRMA, supports online registration, single-sign-on to multiple platforms, a course catalog, management of learner's and instructor's information, and report generation. eRMA is built based on the following guiding principles:

- Build the system in modular, scalable, and open fashion to accommodate future growth and interoperability with other systems using standards such as XML, SOAP, etc.
- Build the system for all KYVU current and potential clients.
- Do all processes through programming; only do non-patterned exceptions manually.
- Enable integration with CMSs and vendor products as deeply as possible.
- Build the system with optimal security and protection of privacy.

eRMA provides us these functionalities –

- Kentucky Virtual eLearning Portal: Using ANGEL portal, the KYVU enable the "My Courses" nugget to include all courses with which learners or instructors were associated no matter what CMSs they used. In addition, the KYVU developed a "My Services" nugget where learners could change their passwords and review their course enrollment status, and, instructors could access eRMA to manage their course catalog information and generate student rosters or reports.
- Auto-enroll and Single Sign-on: With one userID, a user can access multiple CMSs.
- Reports: Web-based database queries are designed to generate reports on enrollment and course information. It provides preset and custom reports. It also allows users to customize their reports and save them for their own personal use.
- E-Commerce: This service relies on the state-wide e-Payment Gateway that connects to Link2Gov, a contracted credit card processor.
- Unified Registration Forms and EduCart: Provider-based and course-based data elements are integrated into online registration forms to provide system-wide synchronization. A shopping cart named EduCart allows users to select multiple courses from multiple providers in one registration process.
- Single Sign-on for Kentucky Virtual Library (KYVL): Using the server-to-server mechanism, the authentication process links KYVU users directly into the licensed databases without going through another login. This access is included in the "My Services" nugget in the KY Virtual eLearning Portal.
- Keyword Database for Catalog Search & Retrieval: In order to provide structured searches for course catalog, the KYVU uses a hierarchical database for CIP code, subject discipline, CIP descriptor, and keyword to provide access to programs and courses. Assignment for these descriptors is restricted to our KYVL librarians.

Three Technology Environments

KYVU has three environments: Development, Test and Production. Applications are first built in development, then moved to test, and finally, after user acceptance, test moves to production.

- Development environment is housed at Decision Academics, a technology vendor for Embanet
  - Windows 2000 with IIS installed
  - SQL Server 2000 as database server
  - Visual Source Safe
- ANGEL Server is housed at Embanet.com – KYVU's integrator
  - 2 Intel Xeon 3.0 Gig CPU with HT
  - 4 BG RAM
  - 140 Gig HDD
  - 2 Intel 100/1000 Network Cards
  - Windows 2000 Advanced Server
  - IIS 5.0
  - SA Fileup 5.0
- SQL Server is housed at Embanet.com – KYVU's integrator
  - 2 Intel Xeon 3.0GB CPU with HT
  - 4 GB RAM
  - 140 HDD
  - 2 Intel 100/1000 Network Cards

- Windows 2000 Advanced Server
- SQL 2000 Enterprise Server

Detailed Functional Requirements

Databases

1. Currently the eRMA database drives the KYVU portal, course creation, deletion, enrollment and learner/instructor information. If other data fields are needed to be added to eRMA database that should be discussed and approved by both KYVU and the partner.
2. If eRMA needs to interfaces with an external database, this may be negotiated.

Course Catalog

1. Course catalog information can be added using Manage Courses/Sections area of eRMA. Access to this feature of eRMA is available to client's staff that has Coordinator rights.
2. This information will be reviewed and approved by KYVU Call Center
3. Then KYVU Call Center creates course shells in respective CMS.
4. Once course is ready in CMS KYVU Call Center opens course online for learners to register.

Registration

Online registration includes the following:

1. Select multiple online courses using EduCart.
2. Fill out and submit registration form upon finishing selection.
3. Co-requisite is automatically added to shopping cart.
4. If a pre-requisite has not been completed, the registrant is alerted that registration cannot continue.
5. If a section cap has been set and filled, registration cannot proceed.
6. Authenticate registered users.
7. Store user's registration data into eRMA for logging in and reporting purposes and to pass appropriate information to CMSs.
8. Email notification of userID and password information to learners, instructors and designated personnel upon registration.

Payments

E-Commerce:

The E-commerce initiative refers to the validation of payment for products and/or services purchased by customers through the client's website. This process involves the real time verification of payment via e-Payment Gateway, Link2Gov and storage of the transaction information (including confirmation number) within eRMA.

1.1 Functionalities:

- Secure Connection
- Real-time verification of funds (within 20 seconds)
- Confirmation email notification of userid and password to learners, instructors and designated personnel within same web session.
- Scalable architecture so that future offerings will require very little coding.
- Track confirmation numbers.
- Reconciliation of fund balance & accounts.

1.2 Security-Liability issue:
- Link2Gov and e-Payment Gateway: As a state contracted vendor and a state portal these two vendors are responsible for interfacing with credit card payment processing.
- KYVU: KYVU is a processing agent on behalf of its partners and is not liable for any misuse of information involved in transactions.
- Partner: As the owner of the online content, the partner will be responsible for all that is not borne by the two designated vendors – Link2Gov and e-Payment Gateway.

1.3 Dependencies
- Vendors who provides payment validations.
- Transaction confirmation.

Manual:

1.4 The partner receives and processes the manual payments.
1.5 The partner processes learner's status change from "Pending" to "Enrolled"
1.6 eRMA sends email notifications to learners, instructors and designated personal.

System Integration

1. eRMA ←→ ANGEL: eRMA passes demographic and enrollment data to ANGEL. ANGEL demographic data is passed back to eRMA from ANGEL portal. Data integrity has to be maintained since ANGEL is used as portal.
2. eRMA ←→ WebCT, PLATO, W-WIN, LiteracyLink, LTTS : Transfer of online registrant account and enrollment data to five different CMSs in order to achieve single sign on.
3. Enrollment data is matched by keeping same userid in eRMA and in ANGEL, WebCT, PLATO, W-WIN, LiteracyLink, LTTS.

Interfaces

001: The purpose of the interface is to provide a mechanism for the transfer of student information from the KYVU eRMA System to the Provider Institution's student administration systems. Successful transmission of this student information between these two systems is critical because it transfers information regarding whether a student has registered for classes within the particular Provider Institution. This interface involves two data files: one containing *admissions* data and the other file containing *registration* data.

012: The purpose of this interface is to transfer student application and registration information from the Provider Institution's student administration system to the KYVU eRMA System. For those courses that are offered via KYVU, the Provider Institution should indicate when students register for them at the institution. This interface involves one data file: containing *registration* data.

Each data file – flat ASCII files – contains data for only one provider institution. The interfaces are generated from the KYVU via secure FTP on midnight EST each day.

Archiving and Deleting Old Files

Under each provider institution directory there will be a "NEW" directory and an "OLD" directory. The most recent data file that is created for Interface 001 will be placed under the

"NEW" directory. The data file name will contain a date as the extension. This date clearly distinguishes data files on a day-to-day basis. Once a file is pulled from the directory via FTP, that file should be copied to the "OLD" directory by the provider Institution. If no file has been transmitted then no data file will exist in the "NEW" directory and no data file will be transmitted on that day. This will also alleviate the need for a phone call each time Interface 001 is run. If a data file exists then FTP will be used, otherwise FTP is not necessary. However, in a situation where there is confusion about the data files on the server, either a phone call or an E-mail to the KYVU Call Center should be used for verification.

Other Fields in KYVU's Registration Request Form:

These fields are collected by KYVU via the web-based Unified Registration Form (URF) and can be accessed by KYVU Providers via eRMA.

Prefix
High School Diploma
High School Graduation Date
International Student Indicator
Country of Citizenship
Intended Credential
Prior Postsecondary Attendance
Prior Postsecondary Attendance Dates
Admit Type
Indicator: student is eligible for enrollment at previous postsecondary institution.

Data Load / Migration (If Applicable)

1. Partner's database is the database of the record.
2. eRMA database is a processing database for client.
3. Batch process or direct database connection via API will be used to pass data to/from clients database to/from eRMA.
4. Web services is the preferred method for passing data if feasible.

Security

1. eRMA is equipped for role-based and provider based access permissions.
2. To achieve single sign-on in a secure way eRMA is using token-based authentication in ANGEL, ticket-based authentication in WebCT, and key-exchange mechanism for PLATO.
3. SSH is used to secure FTP transactions.
4. SSL is used to provide data encryption for eRMA and all web forms.
5. Embanet, KYVU's technology vendor, KYVU's servers are housed creates a custom security protocol that addresses issues such as Encapsulating Security Payload (ESP), Authentication header (AH), NAT and firewall traversal, Authentication Header (AH) and general IP security.
6. Archiving policy at Embanet is to take daily backups and building monthly archive that is permanently removed from backup rotation and store offsite.

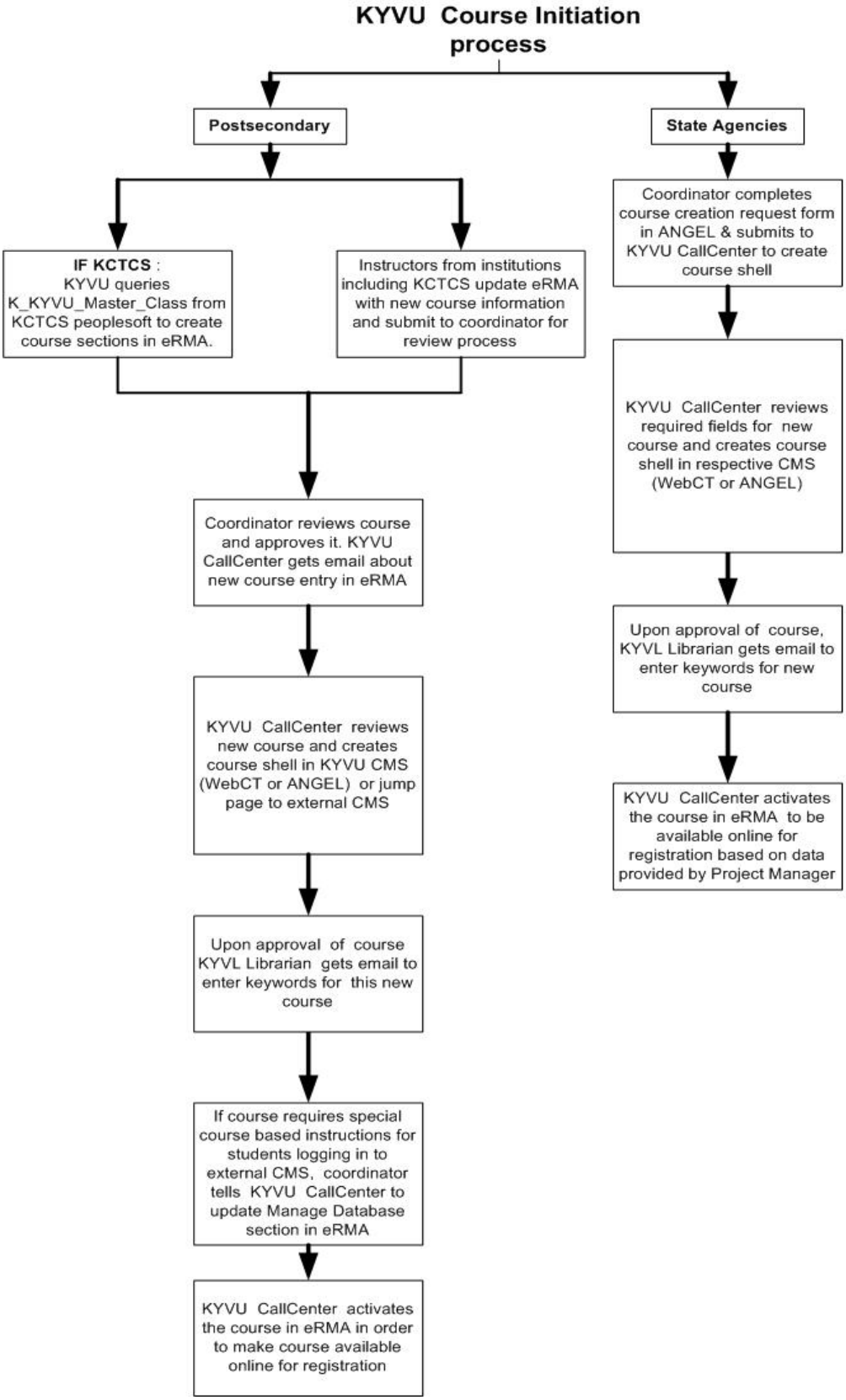
Reports

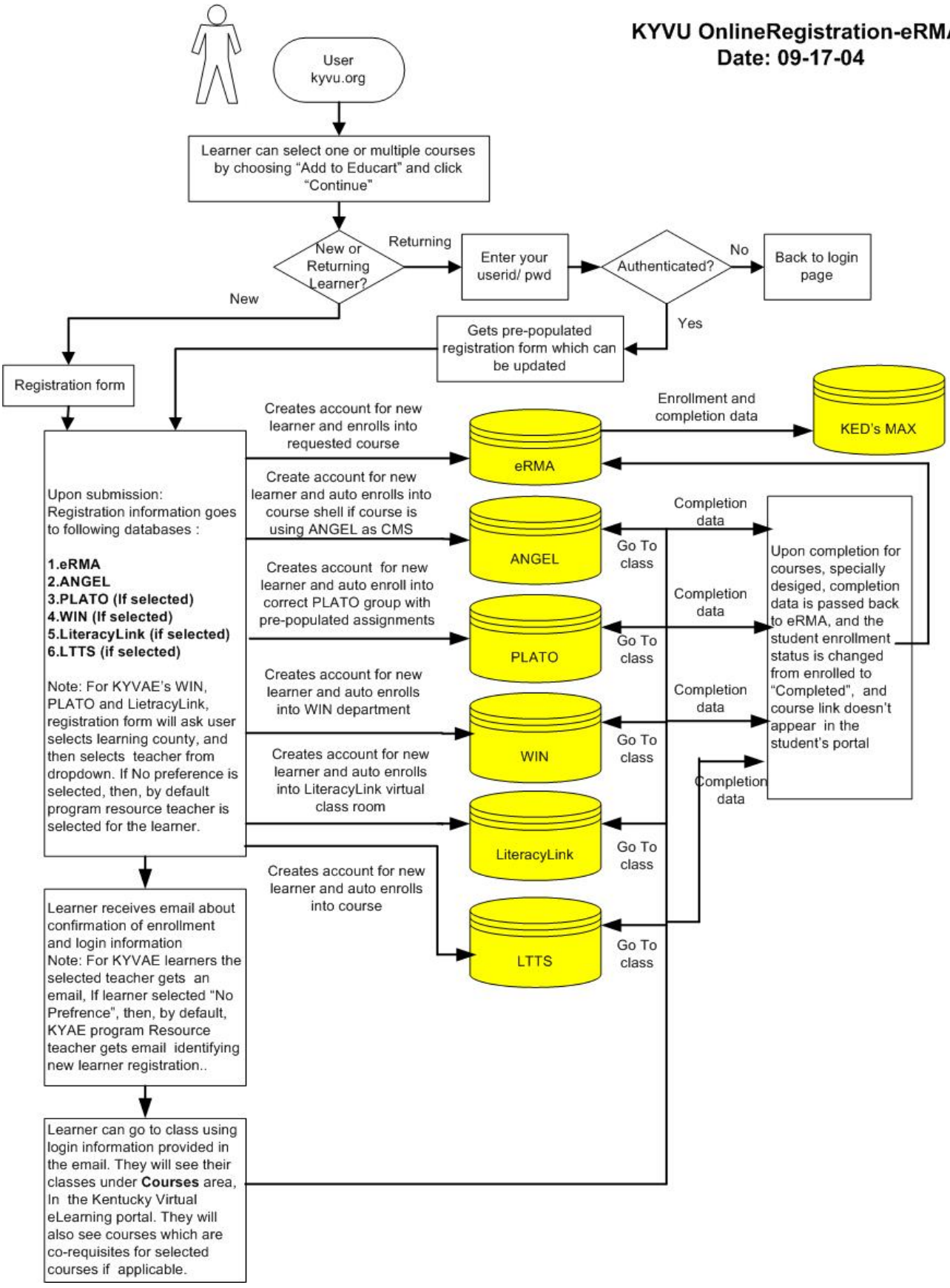
1. "Manage Reports" area of eRMA can be used to view or generate reports.
2. Reports can be available in HTML format and can be transferred into Excel or CSV file.
3. Reports can be generated using selectable filters, display fields, and can be saved as user-based preset reports.

Testing

1. Develop and document test cases for all functionalities specified in this document.
2. Test the test cases in Test Environment.
3. Verify each test case by all the project team members.
4. If problem occurs, it goes back to development team.
5. Perform one end-to-end final testing before user acceptance test.
6. Transfer all files from Test Environment to Production following successful user acceptance test.
7. Test on Production Environment by pilot group.

How to Begin Offering Your Courses via KYVU




KYVU OnlineRegistration-eRMA
Date: 09-17-04
User
kyvu.org
Learner can select one or multiple courses by choosing "Add to Educart" and click "Continue"
New or Returning Learner?
Returning
New
Enter your userid/ pwd
Authenticated?
No
Back to login page
Yes
Gets pre-populated registration form which can be updated
Registration form
Upon submission:
Registration information goes to following databases :
1.eRMA
2.ANGEL
3.PLATO (If selected)
4.WIN (If selected)
5.LiteracyLink (if selected)
6.LTTS (if selected)
Note: For KYVAE's WIN, PLATO and LietracyLink, registration form will ask user selects learning county, and then selects teacher from dropdown. If No preference is selected, then, by default program resource teacher is selected for the learner.
Creates account for new learner and enrolls into requested course
eRMA
Enrollment and completion data
KED's MAX
Create account for new learner and auto enrolls into course shell if course is using ANGEL as CMS
ANGEL
Completion data
Go To class
Creates account for new learner and auto enroll into correct PLATO group with pre-populated assignments
PLATO
Completion data
Go To class
Creates account for new learner and auto enrolls into WIN department
WIN
Completion data
Go To class
Creates account for new learner and auto enrolls into LiteracyLink virtual class room
LiteracyLink
Completion data
Go To class
Creates account for new learner and auto enrolls into course
LTTS
Go To class
Upon completion for courses, specially desiged, completion data is passed back to eRMA, and the student enrollment status is changed from enrolled to "Completed", and course link doesn't appear in the student's portal
Learner receives email about confirmation of enrollment and login information
Note: For KYVAE learners the selected teacher gets an email, If learner selected "No Prefrence", then, by default, KYAE program Resource teacher gets email identifying new learner registration..
Learner can go to class using login information provided in the email. They will see their classes under Courses area, In the Kentucky Virtual eLearning portal. They will also see courses which are co-requisites for selected courses if applicable.